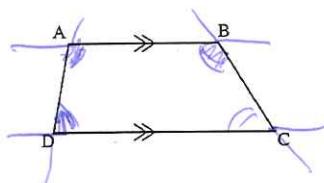


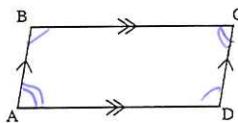
## Special Quadrilaterals

**Trapezium**

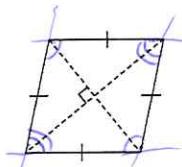
- A trapezium has two parallel sides.
- The sum of the interior angles at the ends of each non-parallel side is  $180^\circ$ . That is,  $\angle A + \angle D = 180^\circ$  and  $\angle B + \angle C = 180^\circ$

**Parallelogram**

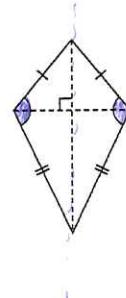
- A parallelogram has opposite sides parallel.
- Its opposite sides are equal.
- Its diagonals bisect each other.
- Its opposite angles are equal. That is,  $\angle A = \angle C$  and  $\angle B = \angle D$

**Rhombus**

- A rhombus is a parallelogram with all its sides equal.
- Its diagonals bisect each other at right angles.
- Its diagonals also bisect the angles at the vertices.

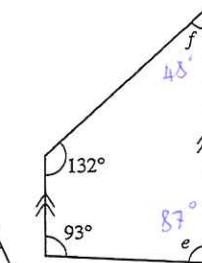
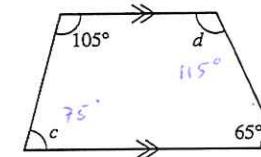
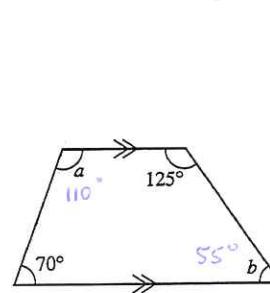
**Kite**

- A kite is a quadrilateral with two pairs of equal adjacent sides.
- Its longer diagonal bisects its shorter diagonal at right angles.
- The opposite angles between the sides of different lengths are equal.

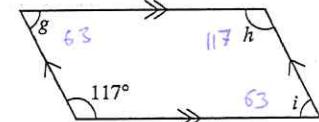
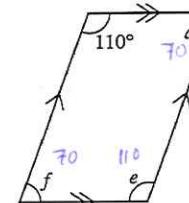
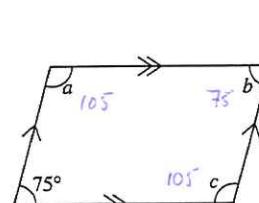


## Exercise 5B

1 For each of these trapeziums, calculate the value of the lettered angles.

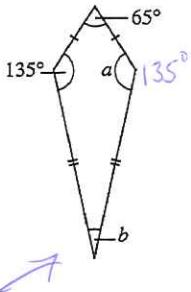


2 For each of these parallelograms, calculate the value of the lettered angles.



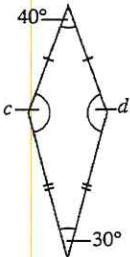


3 For each of these kites, calculate the value of the lettered angles.



$$b = 360 - (2 \times 135 + 65)$$

$$\underline{\underline{b = 25^\circ}}$$



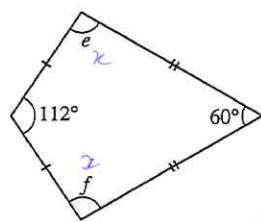
$$c + d = 360 - (10 + 40)$$

$$c + d = 290$$

$$2c = 290$$

$$\underline{\underline{c = 145^\circ}}$$

$$\underline{\underline{d = 145^\circ}}$$



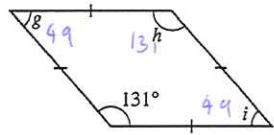
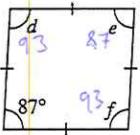
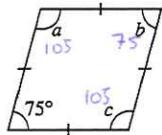
$$2x = 360 - (112 + 60)$$

$$2x = 188$$

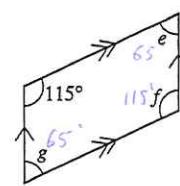
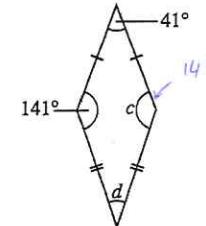
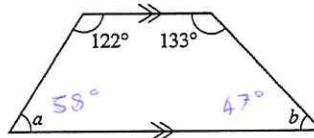
$$\underline{\underline{x = 94^\circ}}$$



4 For each of these rhombuses, calculate the value of the lettered angles.



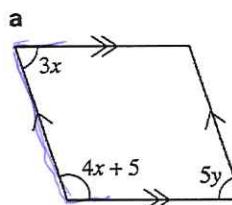
5 For each of these shapes, calculate the value of the lettered angles.



$$d = 360 - (2 \times 141 + 41)$$

$$\underline{\underline{d = 37^\circ}}$$

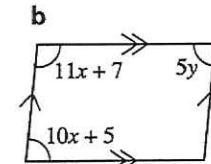
6 Calculate the values of  $x$  and  $y$  in each of these parallelograms.



$$3x + 4x + 5 = 180$$

$$7x = 175$$

$$\underline{\underline{x = 25^\circ}}$$



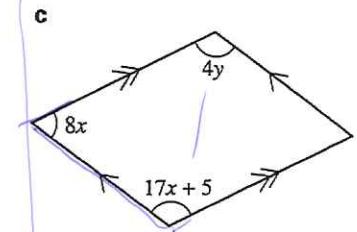
$$2(11x + 7) = 180$$

$$\underline{\underline{x = 8^\circ}}$$

$$5y = 10x + 5$$

$$5y = 85$$

$$\underline{\underline{y = 17^\circ}}$$



$$2(8x + 5) = 180$$

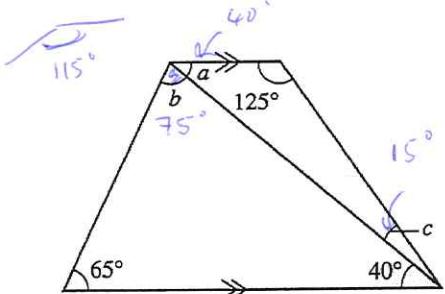
$$\underline{\underline{x = 7^\circ}}$$

$$17x + 5 = 4y$$

$$124 = 4y$$

$$\underline{\underline{31^\circ = y}}$$

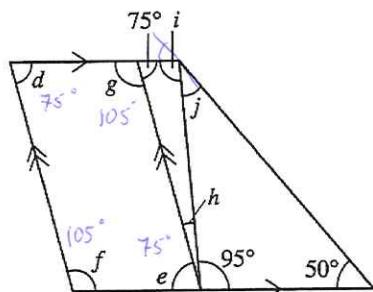
7 For each of these shapes, calculate the value of the lettered angles.



$$a = 40^\circ$$

$$b = 75^\circ$$

$$c = 15^\circ$$



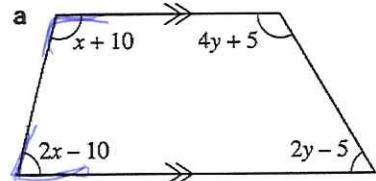
$$h = 180 - 95 - 75^\circ$$

$$= 10^\circ$$

$$i = 180 - 75 - 10^\circ = 95^\circ$$

$$j = 180 - 95 - 50 = 35^\circ$$

8 Calculate the values of  $x$  and  $y$  in each of these trapeziums.

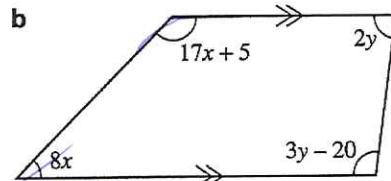


$$3x = 180$$

$$x = 60^\circ$$

$$6y = 180$$

$$y = 30^\circ$$



$$25x + 5 = 186$$

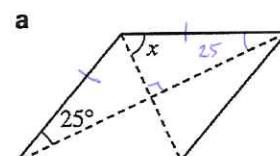
$$x = 7^\circ$$

$$5y - 20 = 180$$

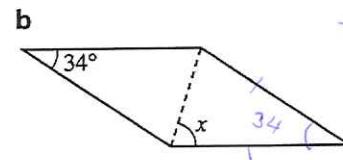
$$5y = 200$$

$$y = 40^\circ$$

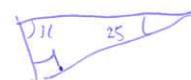
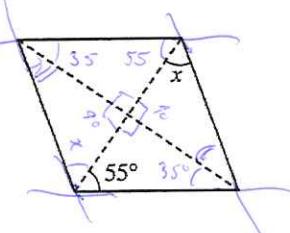
9 Calculate the value of  $x$  in each of these rhombuses.



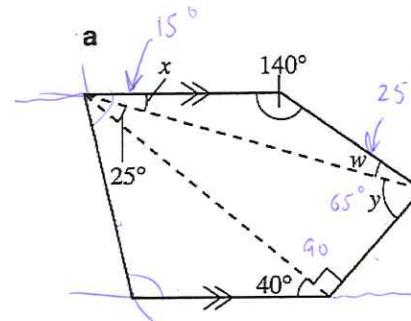
$$x = 65$$



$$\frac{180 - 34}{2} = 73^\circ$$

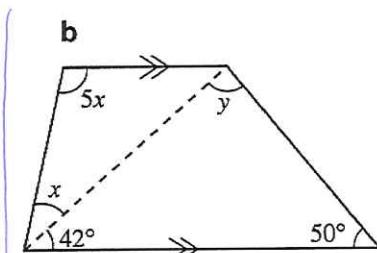


10 Calculate the values of the letters in each of these shapes.



$$y = 180 - (90 + 25)$$

$$= 65^\circ$$



$$6x + 42 = 180$$

$$x = 23^\circ$$

$$y = 180 - (50 + 42)$$

$$y = 88^\circ$$

11 Find the value of  $x$  in each of these quadrilaterals and hence state the type of quadrilateral it is.

- a One with angles  $x + 10, x + 20, 2x + 20, 2x + 10$
- b One with angles  $x - 10, 2x + 10, x - 10, 2x + 10$
- c One with angles  $x - 10, 2x, 5x - 10, 5x - 10$
- d One with angles  $4x + 10, 5x - 10, 3x + 30, 2x + 50$

a.)  $6x + 60 = 360$   
 $x = 50^\circ$

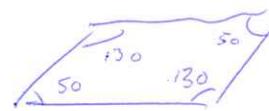
$60^\circ, 70^\circ$   
 $120^\circ, 110^\circ$



TRAPEZIUM

b.)  $6x = 360$   
 $x = 60^\circ$

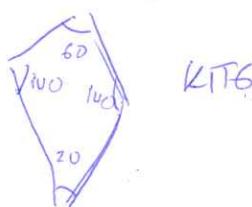
$50^\circ, 130^\circ$   
 $50^\circ, 130^\circ$



PARALLELOGRAM OR RHOMBUS

c.)  $13x - 30 = 360$   
 $x = 30^\circ$

$20^\circ, 60^\circ, 140^\circ, 140^\circ$

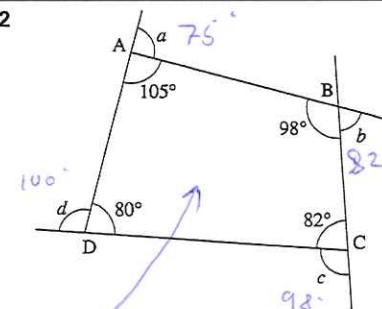


KITE

d.)  $14x + 80 = 360$   
 $x = 20^\circ$

$90^\circ, 90^\circ, 90^\circ, 90^\circ$

SQUARE OR  
RECTANGLE



- a The quadrilateral ABCD has interior angles  $100^\circ, 98^\circ, 82^\circ$  and  $80^\circ$ . Calculate the exterior angles (marked  $a, b, c, d$ ) for each of the interior angles. What is the sum of the angles  $a, b, c, d$ ?
- b Prove that the sum of the exterior angles of any quadrilateral is  $360^\circ$ .

$a + b + c + d = 355^\circ$

NOT POSSIBLE QUADRILATERAL